

The Genus *Phyllodactylus* (Lacertilia: Gekkonidae) in Western Australia

*G.M. Storr

Abstract

In Western Australia *Phyllodactylus* is represented by only one species, *P. marmoratus* Gray, which is divisible into two subspecies: the nominate in the lower west, south-west and south, and *P. m. alexanderi* subsp. nov. in the far south-east (and far western South Australia). The type locality of *P. marmoratus* is restricted to the Houtman Abrolhos, Western Australia.

Introduction

In 1976 M. King and R. Rofe described three chromosome races in the southern Australian gecko *Phyllodactylus marmoratus*, one of which ($2n=34$) was confined to Western Australia. After examining much more western material M. and D. King (1977) reported the presence in Western Australia of two more chromosome races. One of them ($2n=32$) was restricted to a small area south of Pemberton in the deep south-west; the other was the east Australian race $2n=36$, which extended into the south-east of Western Australia as far west as Israelite Bay. The race $2n=34$ was found to occur from Yanchep in the north to Cape LeGrand in the east.

In order to check King and King's belief that these chromosome races probably represented distinct species, I examined specimens of *Phyllodactylus marmoratus* from Western Australia and western South Australia. The following characters were studied: snout-vent length, relative length of tail, rostral shape, rostral contact with nostril, number of internasals, postnasals, upper labials (excluding the undifferentiated small scales lining the rictus), postmentals and subdigital lamellae (excluding the 1-5 series of small scales immediately preceding the pads), shape of mental and postmentals, and dorsal coloration.

Specimens from the range of the $2n=32$ race, including those used by King and King, could not be distinguished morphologically from neighbouring specimens of the $2n=34$ race and so are included in the nominate subspecies. However, the boundary between the races $2n=34$ and $2n=36$ (a north-south line immediately west of Israelite Bay) coincides with small but abrupt changes in coloration and scalation; I have therefore separated the westernmost segment of King and King's $2n=36$ race as a new subspecies.

* Western Australian Museum, Francis Street, Perth, Western Australia, 6000.

As Dixon (1964:110) pointed out, the genus *Phyllodactylus* (type species: *P. pulcher* of Barbados) is almost certainly polyphyletic. Perhaps *Euleptes* or *Paraoedura* (the only generic names based on Old World species) is applicable to *marmoratus*; but this will remain unknown until the phylogeny of the Old World species is deduced.

This study is based on 1103 specimens in the Western Australian Museum (register numbers without prefix) and 84 from western South Australia (numbers prefixed with SAM R) kindly loaned by the South Australian Museum.

Systematics

Phyllodactylus marmoratus marmoratus (Gray)

Figures 1 and 2

Diplodactylus marmoratus Gray (1845:149)

Diagnosis

A small to moderately large subspecies of *Phyllodactylus marmoratus* with dorsal pattern typically consisting of thick, blackish, deeply undulate or zigzagging transverse lines, each followed by a pale spot or blotch.

Description

Snout-vent length (mm): 19-68 (N 897, mean 42.9). Length of tail (% SVL): 86-140 (N 293, mean 115.3).

Rostral more than twice as wide as high, usually hexagonal with apex short to moderately long and flat (occasionally rounded or with one or two notches); rarely a short crease descending from an apical notch. Nostril surrounded by first labial, rostral (except in the 22% of specimens with anterior supranasal contacting first labial), anterior supranasal, posterior supranasal, and 1 (N 764), 2 (62) or 3 (1) postnasals. Posterior supranasal much smaller than anterior supranasal and about as large as undivided postnasal. Internasals 0 (N 2), 1 (192), 2 (500), 3 (127) or 4 (1). Upper labials 6 (N 1), 7 (37), 8 (241), 9 (381), 10 (142) or 11 (12). Mental trapezoid, usually much wider than deep. Postmentals 1 (N 2), 2 (452), 3 (196) or 4 (17); usually (93%) not much longer than wide. Lamellae under fourth toe 7 (N 39), 8 (251), 9 (280), 10 (111), 11 (20) or 12 (3).

Upper surface brownish grey. Back with thick, black or blackish brown, deeply undulate or zigzagging, transverse lines shaped like a series of Us or Ws, each line immediately followed by a small to large, subcircular, amoeboid or rounded oblong, greyish white or pale grey blotch; median Us on back sometimes coalescing to form a series of ellipses or a reticulum; pale spots sometimes absent, small or barely discernible. Pattern on tail similar to that on back except for straighter transverse lines and for continuous or broken, whitish median streak (orange-brown in life).



Figure 1 A *Phyllodactylus marmoratus marmoratus* from the Houtman Abrolhos, photographed by R.E. Johnstone.



Figure 2 A *Phyllodactylus marmoratus marmoratus* from near Walpole, photographed by D. Mead-Hunter.

Distribution

Lower west coast and south coast of Western Australia north to Green Head (with an isolated population much further north in Edel Land) and east to the Thomas River, inland to Mt Lesueur, Moora, Julimar Forest, Mundaring, Dale, Kulin, Lake Grace South, Frank Hann National Park, Peak Charles, Jyndabinbin Rocks, Fraser Range, Heinsman Rock and Junana Rock. Also numerous islands from North Island (Houtman Abrolhos) south and east to Daw Island (Archipelago of the Recherche). See map, Figure 3.



Figure 3 Map of southern Western Australia and western South Australia showing location of specimens of *Phyllodactylus marmoratus marmoratus* (spots) and *P. m. alexanderi* (circles).

Geographic variation

The population on the Houtman Abrolhos is one of the more distinctive. These lizards are smaller (maximum SVL 52 mm) than elsewhere and have fewer upper labials (6-10, N 91, mode 8, mean 8.3 *v.* 7-11, 723, 9, 8.8), fewer postmentals (11.8% with more than 2, *v.* 33.6%) and fewer subdigital lamellae (7-11, N 71, mode 8, mean 8.2; *v.* 7-12, 633, 9, 8.9). This population did not necessarily acquire its differences in isolation, for the now-extinct population of the opposite mainland may have had similar characteristics. At any rate the Abrolhos lizards are connected by clines to another distinctive population, that of the deep south-west.

Specimens from the deep south-west (including those with $2n=32$ chromosomes) are characterised by large size, strong colour pattern (here the pale blotches are

largest, whitest and most rectangular [Figure 2]), high number of internasals (41% with more than 2, *v.* 13.2% elsewhere) and high number of postnasals (53.5% with more than one, *v.* 3.3% elsewhere. Eastwards the geckos are more like those of the west coast (Figure 1).

Another fairly distinctive population is that of the southern wheat belt. Here the dorsal pattern is finer than elsewhere and the pale markings are reduced, both conditions foreshadowing those in the next subspecies.

Remarks

Gray based this species on four specimens collected by John Gilbert in the Houtman Abrolhos and on one labelled 'Australia'. I hereby restrict the type locality to the Houtman Abrolhos, Western Australia.

As mentioned earlier, specimens with $2n=32$ chromosomes and others collected from the same or nearby localities could not be distinguished morphologically from neighbouring specimens with $2n=34$ chromosomes.

Material

North-West Division (WA)

False Entrance Well, Carrarang (69846).

South-West Division (WA)

North I. (13684, 15336-9, 47821-2); Pelican I. (15346-55); West Wallabi I. (15340-5, 29494); Tattler I. (15357-60); Turnstone I. (25831-2); Rat I. (30459-60, 41238-40, 41523, 41534, 41540-1, 41543-5, 93704); Little Rat I. (37513); Morley I. (37539, 41528-32); Wooded I. (37540-5, 41518-9); Shark I. (37505-6); Basile I. (27172); Pelsaert I. (27144-60, 52023, 58915-8); Gun I. and islets S of it (27189, 30455-8, 30469-70, 40232); Murray I. (30454); islet off Green Head (15361-3); 5 km W Padbury (49094); Cockleshell Gully (48432); Mt Lesueur (11166); Sandland I. (15364-77, 58909-10); Hill River ford (12876); 16 km SE Jurien (46592); Whittell I. (93719); Green Is (15378-401, 19153, 58896, 93720); Yewadabby Spring (15402-3); Woolka Woolka (15404-6); Dandaragan (25991); 5 km W Moora (12875); Koojan (40658); Wedge I. (93721); Julimar Forest (47792, 85195); Yanchep (12880, 59947-50); Neerabup National Park (59355, 59391-2); Burns Beach (83115); Wanneroo (78476); Mussel Pool (51525-6); Tuart Hill (93722); Dianella (36323); Maylands (24687-8); Mt Lawley (28952); Wembley Downs (24886, 73458); Reabold Hill (39641-2); Subiaco (3312); Leederville (3328); Perth (7540); Mundaring Weir (16530); Kalamunda (14183) and 9 km E (14667, 19238, 19749, 19924, 19980, 20593, 20598); Victoria Park (78235); Crawley (15409-12); Dalkeith (19680); Cottesloe (15407-8); South Perth (2973, 25979); Como (3761); Lesmurdie (15413-4); Riverton (54255); Applecross (4210, 21848); Alfred Cove (75553); Rottnest I. (2554, 2855, 3273-82, 3754-6, 12762-3, 14242, 15415-7, 15419-22, 17128, 51756); Green I. (58901-2); Willagee (54409); Kelmscott (51424); Forrestdale (4390, 93731); Carnac I. (11996-7, 15423-31); Garden I. (3314, 28473-4, 35029-34, 54381, 87989-91); Brookton Hwy 54 km

ESE Kelmscott (58276, 58284-5); Rockingham (47353-6); Bird I. (15432-6, 58905); Seal I. (15437-40); Shag I. (7885, 15441, 58904); Penguin I. (7886, 15442-56); first island S of Penguin I. (58906); Jarrahdale (78062) and 13 km E (87924); Yunderup (37753); Kulin (4218); Boddington (4939); Waroona (41242); Yalgorup National Park (73585); Narrogin (25964-5, 43926); 3 km SW Nalyerin Lake (76285); 22 km N Collie (82783-5) and 25 km W (49256); Brunswick Junction (26460); Bunbury (4606, 5348); Dongolocking Reserves (49601-8, 49765-6); south end Lake Grace Reserve (43824); Chinocup Reserve (41077-83); Lake Magenta Reserve (39911-3, 39926, 43983, 45304, 45321, 47332-3); Ravensthorpe (10518-9, 30816) and 8 km N (54292) and 27 km W (44830-2, 44839) and 15 km ESE (67417-8); Cape Naturaliste (29897-8, 54261, 54268); Meelup (49661-4); Point Picquet (67398-400); Dunsborough (15457-60, 40830); Yallingup (48296-7); Busselton (26841) and 15 km NE (67407); 17 km SW Boyup Brook (22273) and 12 km SW (31119-21); Katanning (40981); Ongerup (2512-3, 2516, 2518-9, 15511) and 10 km SE (42618-21); Jerramungup (15512-3) and 40 km NNE (83182); Kybulup Pool (89461-3); Gordon Inlet (86978-82, 86991-2, 89483); Hopetoun (6421, 55939); East Mt Barren (15554); Fitzgerald River (39000); upper Twertup Creek (36976-83); Twertup (85468); middle Fitzgerald River (36791-801, 36857, 36859-62, 36870-2, 36908-10, 36943-50, 36954-8); Mid Mt Barren (36895-6); Dempster Inlet (36805, 36807-8); Fitzgerald Inlet (36923-5, 55932-3, 56061-3) and SW (36930-2); Fitzgerald National Park (89282); Mt Bland (47731); Boondadup River (37186, 37201, 37214-5); Quaalup (59041-2, 59044-5); 25 km N Bremer Bay (36185-6, 47730); Bremer Bay (47730); Pallinup River (269, 271, 27414-6); Bluff Knoll (51774); Red Gum Pass (54260, 67487); Stirling Range (15510); near Tambellup (1345, 2267, 2328); between upper reaches of Perup and Tone Rivers (42549-52); 13 km S Heartlea (64906); Perup River (15508); Newbicup (443); Bridgetown (7259); Margaret River (47753-4); Witchcliffe (58749); Forest Grove (5904); Boranup (13877, 19832, 93702-3); Hamelin I. (15461-79); outer island, Cosy Corner (21294); Deepdene (12777-8); Augusta (6200-1, 39127); and 8 km N (37800, 37803-4); Cape Leeuwin (273-4, 12782, 15485-6, 26660-4, 54259, 54265, 54297-8); St Alouarn I. (15487-91, 83993); Gingilup Swamp (80747); Manjimup (5605); near Pemberton (8496); 10 km W Rocky Gully (15509); 70 km NW Walpole (54273, 54308, 54322-3, 54327); Yeagerup (47864, 47923); Meerup (47886); Muirillup Rock (54330); Granite Peak (54258, 54262); Little Chudalup (49707); Mt Chudalup (15492-506, 49714, 54252-3, 54257, 54304, 54326); 35 km NW Walpole (54307, 54325); Broke Inlet (47799, 47968-72, 68161-3); Chatham I. (49832-7); Walpole (51437, 51449, 51452-3, 51465); Nornalup (6897); Valley of the Giants (19842-4, 26042-4); Kent River (44665-8); 45 km S Rocky Gully (46259); Denmark (17658, 19841, 54263) and 16 km N (43828, 43839) and 15 km NE (71027-8); Mt Barker Look-out (54272); Mt Barker (54254) and 22 km E (54271); Devils Slide, Porongorup Range (54264, 54331); Cheyne Bay (47734-5); Cape Riche (15553, 47733); Bald I. (15518-51, 19952-61, 19962-4, 19975, 40812-4, 40817, 53095, 53176, 53196-

204, 53223-4); Cheyne Beach (15516-7, 36007, 36034); Waychinicup River (15514-5, 61388); Mt Manypeaks (17869-71, 54345); Manypeaks (81284); Two Peoples Bay (36367, 44981-2); Chorkerup (5903); Pelican I., Wilson Inlet (19835-40, 37899-901); Albany (10945, 11054, 24088, 25836, 54296, 54324); Breaksea I. (52168-72); West Cape Howe (21830-1, 73176); Torbay Head (51789); Eclipse I. (6796-8, 11276, 45770, 49668-75).

Eucla Division (WA)

13 km E Fraser Range (30750); 8 km N Jyndabinbin Rocks (58053) and 35 km E (62452); Clear Streak Well (58044) and 8 km NNE (58006); Frank Hann National Park (78395); Peak Charles National Park (78407-9); 10 km NNW Heinsman Rock (59726-7); Junana Rock (22524); 37 km N Esperance (15559); 10 km N Linkletter's Place (85025-6); Dalyup River (15555-8); Stokes Inlet (82995); Esperance (11367, 15560-2, 25842-9) and 23 km E (15563-4); mouth of Thomas River (36269); Duke of Orleans Bay (42476-8); Frenchmans Peak (67742-3); Mt LeGrand (22526-8, 41999); Cape LeGrand (42000); Figure of Eight I. (10118); Thomas I. (10233); Sandy Hook I. (10123-4); Remark I. (8683); Corbett I. (53150); Wilson I. (53143-4); Termination I. (10126); Mondrain I. (15566-7, 35108, 53118, 53120, 54421, 68195-7, 68227); North Twin Peak I. (53074-85); South Twin Peak I. (53132-5); Middle I. (47659); Salisbury I. (76330, 763367-7, 76342, 76348-51, 76355); Daw I. (76361, 93630).

Phyllodactylus marmoratus alexanderi subsp. nov.

Figure 4

Holotype

R281 in Western Australian Museum, collected by W.B. Alexander in 1914 at Eucla, Western Australia, in 31°43'S, 128°53'E.

Paratypes

For details of 240 specimens from Western Australia and South Australia see under Material.

Diagnosis

Differing from *P. m. marmoratus* in its dorsal pattern typically consisting of fine, blackish, shallowly zigzagging or undulate transverse lines; lines on back not followed by a pale spot or blotch. For differences in scalation see under Remarks.

Description

Snout-vent length (mm): 19-61 (N 241, mean 41.6). Length of tail (% SVL): 98-141 (N 89, mean 113.2).

Rostral usually more than twice as wide as high, usually pentagonal with upper sides curving up to a rounded apex (occasionally hexagonal with apex short and flat or with one, rarely two, notches); very rarely a short crease descending from an apical notch. Nostril surrounded by first labial, rostral (except in the 5% of specimens with anterior supranasal contacting first labial), anterior supranasal, posterior supranasal and postnasal (invariably single). Posterior supranasal usually

much smaller than anterior supranasal and usually slightly larger than postnasal. Internasals 0 (N 15), 1 (155), 2 (55) or 3 (14). Upper labials 7 (N 15), 8 (88), 9 (102), 10 (29) or 11 (3). Mental trapezoid, wider than deep. Postmentals 1 (N 3), 2 (88), 3 (90) or 4 (1), commonly (60%) much longer than wide. Lamellae under fourth toe 7 (N 6), 8 (30), 9 (72), 10 (53), 11 (33) or 12 (4).

Upper surface brownish grey or greyish brown. Back with fine, blackish, shallowly zigzagging or undulate, transverse lines, not followed by a pale spot or blotch (at most and rarely a transverse series of white dots); dorsal lines sometimes broken up into numerous scattered short dashes or (especially on neck and foreback) modified into a median series of ellipses. Dark transverse lines on tail straight or chevron-shaped, immediately followed by a whitish triangular spot or longitudinal streak (orange-brown in life).



Figure 4 A *Phyllodactylus marmoratus alexanderi* from Eucla, photographed by G. Harold.

Distribution

The Nullarbor Plain and adjacent coasts of south-eastern Western Australia and far western South Australia, west to Balladonia HS and Israelite Bay, north at least to the Trans Australian Railway, and east to Cook and Head of Bight. See map, Figure 3.

Remarks

The differences between this and the nominate subspecies are less significant than the abruptness of the change, which parallels the equally abrupt change in

habitat — *P. m. marmoratus* on the precambrian shield and *P. m. alexanderi* in the Eucla Basin.

Apart from coloration, *P. m. alexanderi* differs from neighbouring *P. m. marmoratus*, i.e. those of the Eucla Division, in several scale characters. The rostral is much more frequently (60% *v.* 27%) pentagonal with a gable-like apex and is much more frequently (70% *v.* 10%) in wide contact with the nostril. A much higher proportion of specimens have fewer than two internasals (71% *v.* 23%) and have the postmentals long and narrow (60% *v.* 10%). There are more subdigital lamellae (7-12, N 198, mode 9, mean 9.4 *v.* 7-10, 63, 8, 8.3).

On Eyre Peninsula, judging from 71 specimens from the Nuyts Archipelago, Smoky Bay, Port Neill, Tumby Bay and Reevesby Island, coloration is mostly as in *P. m. alexanderi* but some aspects of scalation are considerably different. The rostral is usually hexagonal with a short flat apex and is usually excluded from the nostril. Only 15% of specimens have fewer than two internasals, and only 12% have the postmentals much longer than wide. Because these scale differences are as trenchant as those separating *P. m. alexanderi* and *P. m. marmoratus*, the Eyre Peninsula population cannot be included in *alexanderi*.

Derivation of name

After William Backhouse Alexander (1885-1965), Keeper of Biology in the Western Australian Museum from 1915 to 1919.

Material

Eucla Division (WA)

Israelite Bay (31111-2, 54256, 54269, 67211-2); Balladonia HS (53356-61) and 70 km ENE (31897-9); 11 km E Kilidwerinia Granite Rock (91318, 91339, 91341, 91343, 91348); Mullendunya Tank (45354); Toolinna Rockhole (45344-6, 45645, 66801-33, 83963-4) and 3 km SW (66687-714) and 11 km WSW (66777) and 27 km N (93738) and 7 km N (93737, 93739-40) and 7 km NE (66987) and 6 km E (93736); Toolinna Cove (66780-1); 42 km WSW Caiguna (24670-1, 31895) and 14 km W (54314); Baxter Memorial (51807); Twilight Cove (44979); Cocklebiddy (54315, 67240) and 11 km W (54329) and 10 km SSE (66968-9) and 14 km SSE (66783) and 25 km ESE (34449-50); 6 km ENE Moondadong Rockhole (91345); 4 km SW Graham Tank (91956-7) and 10 km SSW (91317); Eyre (67314); Nurina (37664); Lynch Cave (28707); 8 km S Loongana (29443-54, 34494-50); 40 km N Madura (36168) and 33 km N (29424-9); Madura Cave (25472); Madura Pass (24650-1, 29468-9); 15 km NNW Middini Beach (91314-5, 91340, 91342, 91344) and 10 km NNW (91316); 91 km W Mundrabilla (54266); 12 km NW Mundrabilla HS (36472); 8 km SW Yuwanyadi Rockhole (91346) and 19 km S (91347); 23 km S Reid (37672-3) and 65 km SSE (37665); Eucla (24603-6, 31875, 54270, 66480, 66482-7, 66627-8, 66630-1) and 4 km S (66612, 66612, 66862-71); Wilson Bluff (37047; SAM R117513 A-B, 25635-6).

South Australia

Warbla Cave (SAM R15981 A-B, 25632, 26264); 17 km E Western Australian border (SAM R23042-8) and 30 km E (SAM R15789); Koomoolooobooka Cave (25405-15); 11 km W Koonalda (SAM R29218-24); Koonalda Cliffs (SAM R15980); 12 km SE Cook (31872); Knowles Cave (SAM R26402); Nullarbor IIS (SAM R4983 A-B) and 52 km N (36163) and 29 km N (SAM R25665, 25669-70) and 7 km NW (SAM 25657); White Wells Cave (SAM R25620); Head of Bight (SAM R5831).

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